BAJOCIAN STEPHANOCERATID AMMONITES FROM THE BAKONY MOUNTAINS, HUNGARY

by A. GALÁCZ

ABSTRACT. Ammonites are described from the Bajocian *Otoites sauzei* and *Stephanoceras humphriesianum* Zones in a stratigraphically discontinuous red, pelagic limestone sequence. The fauna consists mainly of phylloceratids and lytoceratids, thus showing a typical Mediterranean association. The Ammonitina are almost exclusively represented by stephanoceratids, suggesting a part of the *Sauzei* Zone and two subzones of the *Humphriesianum* Zone. The *Sauzei* Zone is indicated by a single specimen of *Emileia* sp. The upper part of the *Stephanoceras humphriesianum* Subzone is suggested by *Dorsetensia subtecta* Buckman and associated stephanoceratids: *Stephanoceras triplex* Weisert, *S. scalare* Weisert, *S. mutabile* (Quenstedt), and *S. leoniae* Schmidtill and Krumbeck, while the basal part of the *Teloceras blagdeni* Subzone is identified from an assemblage of *Stephanoceras sturanii* Pavia, *S.* (*Normannites*) *orbignyi* Buckman and *S.* (*N.*) sp. aff. *fortis* Pavia. The stratigraphic representation in the sequence is rather incomplete. However, a description of its fauna may help to evaluate similar assemblages recorded in other areas of the Mediterranean region.

DETAILED studies on Jurassic ammonites from the Bakony Mountains (Transdanubian Hungary) have resulted in the recognition of exceptionally rich Liassic faunas. These results contributed substantially to our understanding of Mediterranean Lower Jurassic stratigraphy. Recent investigations indicate a similar, important role for the Middle Jurassic faunas. The ammonites described here came from a typical Mediterranean Jurassic section of red, nodular pelagic limestones below an ammonite-free radiolarite. The fauna represents only a small part of the Middle Jurassic Bajocian stage and consists mainly of phylloceratids and lytoceratids; the Ammonitina are overwhelmingly represented by stephanoceratids.

Stephanoceratidae, that characteristic Bajocian group, are very incompletely known, especially in the Mediterranean. In spite of the relatively large number of described species, the interpretation of taxa and their stratigraphic distribution is far from clear. The aim of this paper is to make known the taxonomy and stratigraphic occurrences of some stephanoceratids within a small, but stratigraphically well-defined succession.

LOCALITY AND SUCCESSION

Közöskút Ravine is a narrow valley at the southwestern margin of the Hajag Hills, near the village of Hárskút, in the Bakony Mountains (Text-fig. 1). The Jurassic sequence exposed here was first mentioned by Noszky (1943), who gave a short description of the local stratigraphy. The Hettangian Dachsteinkalk-type limestone is overlain by higher Lower Liassic, then Toarcian and Bajocian ammonitic limestones, which are followed by a cherty radiolarite, then a complete Upper Jurassic-Lower Cretaceous calcareous succession. Later, in a comprehensive treatment of the Jurassic of Hungary, Noszky (1961) gave a similar summary, indicating some non-sequences in the section.

The outcrop was visited during the Mediterranean Jurassic Colloquium in 1969. A detailed description and sections outlining the Jurassic sequence was given by Fülöp *et al.* (1969, fig. 19) and Fülöp (1971, fig. 10). Konda (1970, pp. 192–193) has described the lithology and the microfacies features of the Liassic and Middle Jurassic rocks. The biostratigraphic evaluation of the ammonite faunas collected was made by Géczy (1971, 1976) for the Liassic, and a preliminary account of the results of Middle Jurassic studies has also been published (Galácz 1976).

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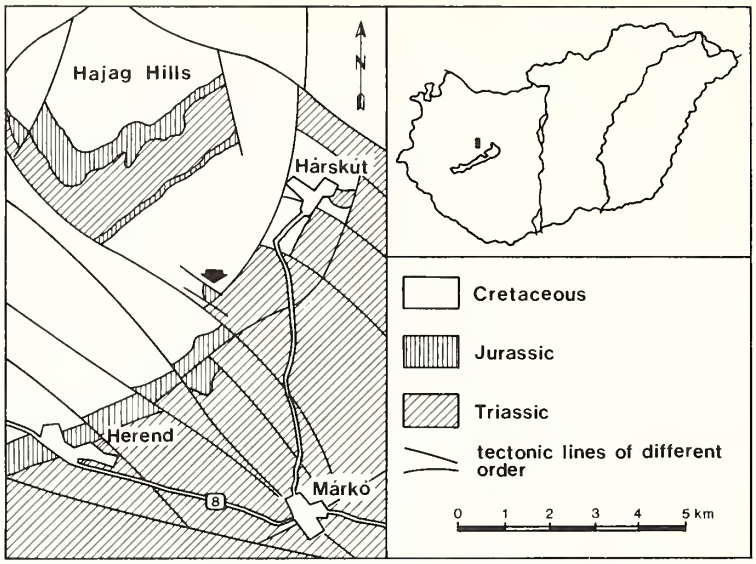


TEXT-FIG. 1. Location of Közöskút Ravine in the Bakony Mountains, Transdanubian Hungary.

These biostratigraphic evaluations made it clear that considerable hiatuses can be identified within this sequence with a basically uniform lithology. The Liassic and the Bajocian is represented here by the typical Mediterranean Rosso Ammonitico limestone, which is a thin, pelagic, nodular carbonate with ferromanganese nodules and crusts. These sequences are common in the Bakony Mountains and elsewhere in the Mediterranean region, and are generally regarded as accumulations on elevated parts of submarine topographic highs in the Jurassic deep-sea Tethys.

In the Közöskút sequence, the incomplete representation of the Liassic and Middle Jurassic is demonstrated by the complete lack of the Sinemurian and Aalenian stages (see Text-fig. 2). However, the documented stages are only partially represented, for the 119 cm thick Lower Jurassic limestones yielded ammonites merely from the *Tragophylloceras ibex* Zone of the Pliensbachian and the *Hildoceras bifrons* and *Dumortieria levesquei* Zones of the Toarcian. Similarly, the 133 cm thick Bajocian series is represented only by the *Otoites sauzei* and the *Stephanoceras humphriesianum* Zones.

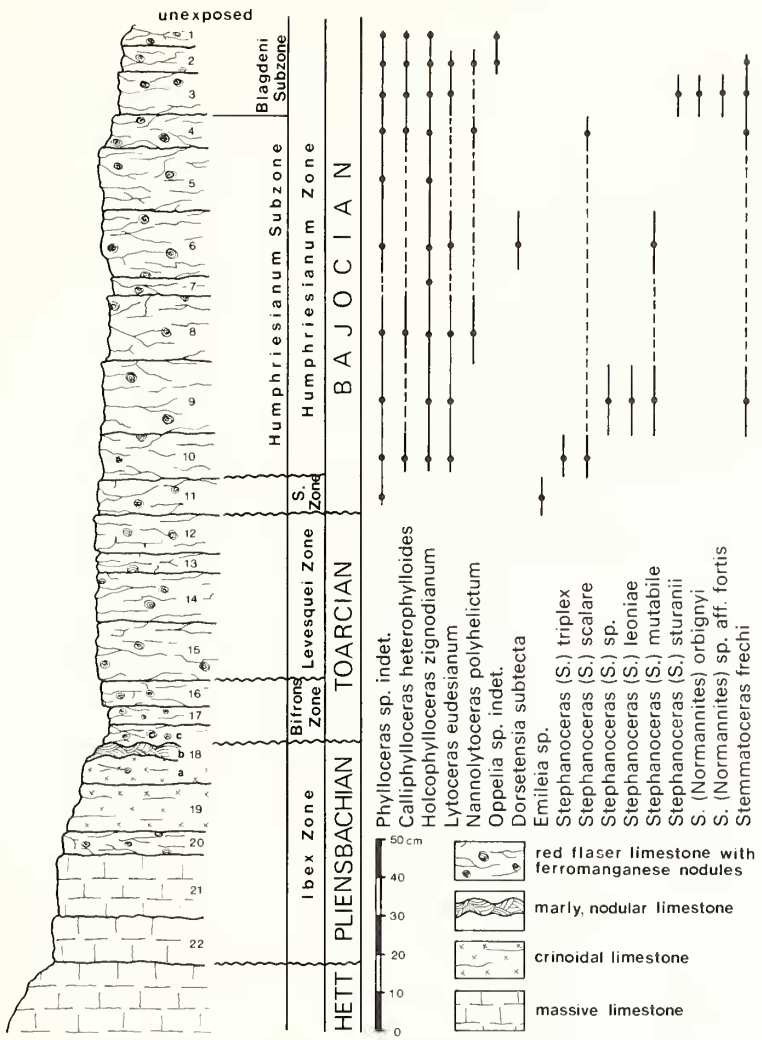
Detailed stratigraphic evaluation of the Bajocian ammonites revealed the presence of further, minor discontinuities. Bed 11, with a single *Sauzei* Zone ammonite species and only two specimens, certainly represents only a portion of this zone. The limestone above Bed 11 gave a fauna with a very rich *Stephanoceras* association, which can be correlated to a limited extent with the middle and upper parts of the *Humphriesianum* Zone.

Jurassic successions of similar lithology and discontinuous biostratigraphic representation, where the paracomformable beds contain only a few faunal horizons of certain stages, are common in the Mediterranean pelagic realm. Thus descriptions of locally intermittent faunal sequences may help to piece together a reliable picture of the ammonite successions for the wider area.

COMPOSITION AND CORRELATION OF THE BAJOCIAN FAUNA

Bed 11, the single layer of *Otoites sauzei* Zone age, gave only two ammonite specimens; therefore, detailed evaluations were made only for the overlying ten beds belonging to the *Stephanoceras humphriesianum* Zone.

In general aspect the fauna is typically pelagic. The megafauna is almost entirely represented by

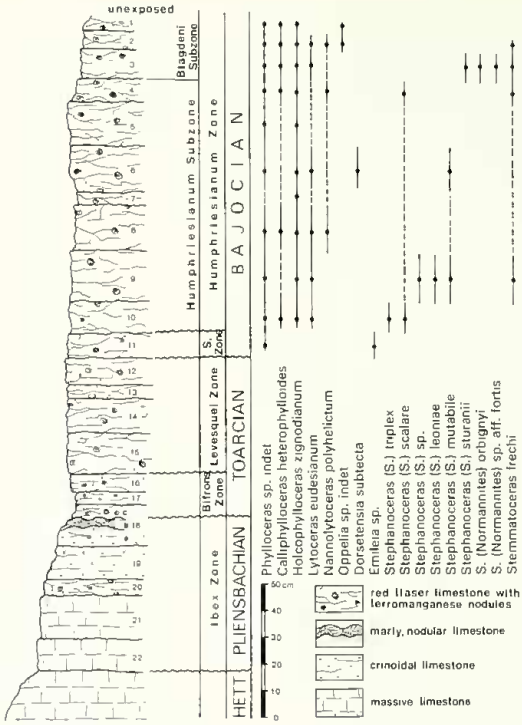


TEXT-FIG. 2. The Lower and Middle Jurassic limestone sequence in the Közöskút Ravine, with the range of the Bajocian ammonites (S. = Sauzei).

ammonites: only a few belemnite rostra, a single bivalve (*Inoceramus* sp.), and one nautiloid were collected. Benthonic elements are completely missing.

The composition of the ammonite assemblages is characteristically Mediterranean, with phylloceratids dominant and lytoceratids common. The percentage distribution of the ammonite fauna gave the following values by suborders: Phylloceratina = 54%; Lytoceratina = 13%; Ammonitina = 33%. A closer analysis of the Ammonitina reveals that this is an almost pure stephanoceratid fauna: there are eighty-seven *Stephanoceras*, *Normannites* and *Stemmatoceras* specimens, but only three poorly preserved oppeliids and a single *Dorsetensia*. Other groups (e.g. sphaeroceratids: *Chondroceras*, *Sphaeroceras*; haploceratids: *Strigoceras*, *Cadomoceras*, *Poecilomorphus*) are conspicuous by their absence.

These features make the Közöskút fauna exceptional among assemblages of similar age. The recently monographed Sub-Mediterranean faunas from Digne, SE France (Pavia 1983), from the



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Betic Cordilleras (Sandoval 1983) and from the Iberian Cordilleras (Fernandez López 1985) are similar in having common elements, but different in faunal composition. The only places where similar faunas were recorded (but only partially documented) are within the s.s. Mediterranean region: from the Alpi Feltrine, N. Italy (Della Bruna and Martire 1985) and from the Appennino marchigiano, Central Italy (Cecca *et al.* 1986).

In the absence of non-stephanoceratid Ammonitina, a correlation with other *Humphriesianum* Zone faunas is difficult. A further complication is that the subzonal subdivision of the *Stephanoceras humphriesianum* Zone, as well as its successive faunal horizons, are incompletely known. Parsons (1976) gave a comprehensive overview of the subzonal units, but in the last decade important new results have been published. Some of the recently suggested subzonal divisions are given in Table 1. This shows that the infrazonal units of the Bajocian *Humphriesianum* Zone are far from generally agreed. While a subdivision into three or four subzones seems to be accepted, several 'horizons' are suggested without exact inter-regional correlation.

PARSONS 1976 (adopted here)	PAVIA 1983	SANDOVAL 1983	DIETL, HAGER and SAUER 1984	FERNANDEZ LÓPEZ 1985	OHMERT 1988
Subfurcatum Zone	Niortense Zone	Leptosphinctes Zone	Niortense Zone	Subfurcatum Zone	Niortense Zone
Humphriesianum Zone: Blagdeni Subzone	Humphriesianum Zone: Blagdeni Subz. (Dubium Hor.)	Humphriesianum Zone: Blagdeni Subzone	Humphriesianum Zone: Blagdeni Subzone	Humphriesianum Zone: Blagdeni Biohorizon	Humphriesianum Zone: Blagdeni Subzone
Humphriesianum Subzone	Humphriesianum Subzone	Humphriesianum Subzone	Humphriesianum Subzone	Scalare Biohorizon	Humphriesianum Subz. (Umbilicum Horizon)
Romani Subzone	Romani Subz. (Paulus H. / Edouardiana H.)	Cycloides Subzone	Pinguis Subzone	Nodosum Biohorizon	Romani Subzone / Pinguis Subzone
Sauzei Zone	Sauzei Zone	Sauzei Zone	Sauzei Zone	Sauzei Zone	Sauzei Zone

TABLE 1. Comparison of some recent subdivisionings of the Bajocian *Stephanoceras humphriesianum* Zone.

The *Humphriesianum* Zone fauna of the Közöskút Ravine can be divided into two assemblages. The lower one, from Bed 10 to Bed 4 contains stephanoceratids, *Stephanoceras triplex*, *S. scalare*, *S. mutabile*, *S. leoniae*, and the associated *Dorsetensia subtecta*. The best match with this fauna is that from Beds 355 to 339 of the Chaudon section, Digne area (Pavia 1983, Table III*b*). While some of Pavia's determinations are reinterpreted here (see descriptions below), the basic composition of stephanoceratids s.s. is very similar. Thus the lower seven beds of the Közöskút *Humphriesianum* Zone section can be correlated with the upper part of the *Stephanoceras humphriesianum* Subzone.

In Bed 3 new elements appear: *Stephanoceras sturanii* and *Normannites* spp. (see Text-fig. 2). Comparable forms are known from the Digne area in the basal part of the *Blagdeni* Subzone ('*Dubium* horizon' of Pavia 1983, pp. 36–37). Accordingly, the topmost part of the Közöskút Bajocian belongs to the lower *Blagdeni* Subzone, and the whole sequence encompasses the boundary beds of the two higher subzones of the *Humphriesianum* Zone.

SYSTEMATIC PALAEONTOLOGY

Deposition of specimens. All the ammonites studied are deposited in the Palaeontological Collections of the Hungarian Geological Survey, Budapest. Measured and illustrated specimens have inventory numbers.

Dimensions. Measurements are given in millimetres, in the following order and with the following abbreviations: maximal preserved diameter (MDm); diameter (Dm); whorl height (Wh); whorl breadth (Wb); and umbilical diameter (Ud). Numbers in parentheses refer to dimensions as a

percentage of the diameter. Pr indicates number of primary ribs, S the number of secondary ribs per whorl.

Order AMMONOIDEA Zittel, 1884
Suborder PHYLLOCERATINA Arkell, 1950
Superfamily PHYLLOCERATACEAE Zittel, 1884
Family PHYLLOCERATIDAE Zittel, 1884
Genus CALLIPHYLLOCERAS Spath, 1927

Type species. Phylloceras disputabile (Zittel, 1868) = *Ammonites tatricus* Kudernatsch *non* Pusch, 1852, p. 4, pl. 1, figs 1–4, by original designation of Spath (1927–33, p. 24).

Calliphylloceras heterophylloides (Oppel, 1856)

Plate 1, fig. 4; Text-fig. 3A

1856	*Ammonites heterophylloides* Oppel, p. 493.
v 1871	*Phylloceras heterophylloides* Oppel; Neumayr, p. 331, pl. 15, fig. 1*a–c*.
v 1878	*Phylloceras heterophylloides* Oppel; Bayle, pl. 32, figs 1, 2, 5–8.
1927	*Phylloceras* gr. de *heterophylloides* Oppel; Roman and Pétouraud, p. 16, pl. 2, figs 9 and 10.
non 1937	*Phylloceras* aff. *heterophylloides* Oppel; Kakhadze, p. 126, pl. 1, fig. 4.
?1937	*Phylloceras heterophylloides* Oppel; Horwitz, p. 240, pl. 9, fig. 1.
1956	*Calliphylloceras heterophylloides* Oppel; Kakhadze and Zesashvili, p. 18, pl. 2, figs 2 and 3.
?1973	*Calliphylloceras* cf. *heterophylloides* (Oppel); Myczinsky, p. 59, pl. 1, fig. 6.
1976	*Calliphylloceras heterophylloides* (Oppel); Joly, p. 213, and figures.

Material. Eleven measured, well preserved internal moulds and several fragments or strongly corroded specimens.

Measurements.

	MDm	Dm	Wh	Wb	Ud
J9471	94·5	94·5	54·5 (57·5)	36 (38)	6 (6·5)
		74	42 (56·5)	25 (33·5)	5·5 (7·5)
		67·5	38 (56)	24 (35·5)	4·5 (6·5)
		41·5	23 (55)	13·5 (32·5)	4 (10)
		21	10 (47)	7 (33)	4 (19)
		11	5 (45)	4·5 (41)	2·5 (22)
J9477	70·5	70·5	41 (58)	24 (34)	5 (7)
		51	29 (57)	18 (35)	4 (8)

Description. Medium size ammonite. Most of the studied specimens are well preserved internal moulds, but the body chamber is usually missing. The umbilicus is narrow, attaining only 5–7% on the outer whorls. The whorl section is high-oval with steep umbilical wall, broadly arched, slightly compressed flanks and narrow, highly arched venter. The inner whorls are inflated. The whorls are smooth, shell-sculpture cannot be seen. The larger forms show seven, rarely eight constrictions per whorl. The constructions are slightly prorsiradiate and straight, becoming curved near the venter, which they cross with a strong forward arch.

The suture line (Text-fig. 3A) is of characteristic *Phylloceras* type, with diphyllid first lateral saddle, triphyllid second lateral saddle, and diphyllid then monophyllid auxiliary elements.

Remarks. The lectotype was designated by Joly (1976, p. 213, pl. 21, fig. 1). This is a relatively large, wholly septate specimen with partially preserved shell from the Upper Bajocian of St Vigor, Calvados, France. Joly figures (1976, pl. 21, fig. 3) another specimen from the same locality as 'paratype'. This is the original of plate 42, figure 2 of Bayle (1878), and thus should be regarded as a topotype. The Közöskút specimens are readily comparable with those from St Vigor. The single difference is in the umbilical width which is extremely small in the large lectotype. On the basis of the detailed statistical studies of Joly (1976, pp. 215–223), *C. heterophylloides* can be easily

distinguished from the similar, but somewhat younger (i.e. uppermost Bajocian to Callovian), *C. disputabile* (Zittel).

Distribution. The exact horizon of the type within the Upper Bajocian is uncertain. The literature mentions this species usually from the *Humphriesianum* Zone, whereas the Madagascan material of Joly came from the Upper Bathonian.

C. heterophylloides is one of the commonest species in the Közöskút Bajocian, occurring in almost every bed of the *Humphriesianum* Zone.

Genus HOLCOPHYLLOCERAS Spath, 1927

Type species. Ammonites zignodianus (d'Orbigny, 1848, p. 493, pl. 182), see Galácz 1980, p. 41.

Holcophylloceras zignodianum (d'Orbigny, 1848)

Plate 2, fig. 2; Text-fig. 3c

1848 *Ammonites Zignodianus* d'Orbigny, p. 493, pl. 182, figs 1–3.
v 1871 *Phylloceras mediterraneum* Neumayr, p. 340, pl. 17, figs 2–5.
1980 *Holcophylloceras zignodianum* (d'Orbigny); Galácz, p. 41, pl. 5, figs 4 and 5; pl. 6, fig. 1; pl. 7, fig. 1; text-figs 30–32. (*cum syn.*).

Material. Twenty-five specimens in various states of preservation.

Measurements.

	Mdm	Dm	Wh	Wb	Ud
J9468	92	92	50 (52·5)	34 (37)	12 (13)
		68·5	35 (51)	23 (33·5)	10 (14·5)

Description. Medium to large specimens; the figured specimen (J9468) is a well preserved internal mould. The deep and narrow umbilicus has low, vertical walls, which form distinct shoulders with the slightly convex flank. The venter is narrow and highly arched. The whorls are smooth, except for the characteristic constrictions, which are prorsiradiate furrows with a sharp break just above the middle of the flanks. There are seven constrictions per whorl. The figured specimen shows the end of the phragmocone at 95 mm diameter; no specimen with an entire body chamber and aperture was found.

The suture line (Text-fig. 3c) shows diphyllic first lateral and triphyllic second lateral saddle and deep lobes.

Remarks. This species was discussed in detail recently (Galácz 1980, pp. 41–44), so this short reference to newly collected specimens seems sufficient.

Distribution. H. zignodianum is a species of extremely wide stratigraphic range, appearing in the Bajocian *Otoites sauzei* Zone and enduring up to the Upper Jurassic. In the Közöskút sequence this is the commonest ammonite, occurring in almost every bed of the *Humphriesianum* Zone.

EXPLANATION OF PLATE 1

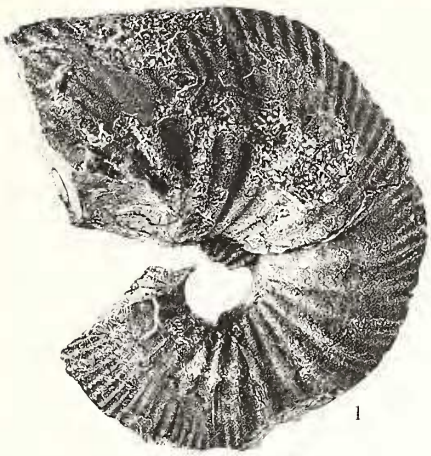
Fig. 1. *Emileia* sp. indet. J9469; Közöskút; Bed 11, *Otoites sauzei* Zone; lateral view, ×1.

Fig. 2. *Stephanoceras* (*Stephanoceras*) *mutabile* (Quenstedt). J9496; Közöskút; Bed 9, *Stephanoceras humphriesianum* Subzone; lateral view, ×1.

Fig. 3. *Stephanoceras* (*Stephanoceras*) sp. J9488; Közöskút; Bed 9, *Stephanoceras humphriesianum* Subzone; lateral view, ×0·6.

Fig. 4. *Calliphylloceras heterophylloides* (Oppel). J9477, Közöskút; Bed 2, *Teloceras blagdeni* Subzone; lateral view, ×0·75.

Fig. 5. *Stephanoceras* (*Stephanoceras*) *sturanii* Pavia. J9461; Közöskút; Bed 3, *Teloceras blagdeni* Subzone; lateral view of a specimen with distorted body chamber, ×1.



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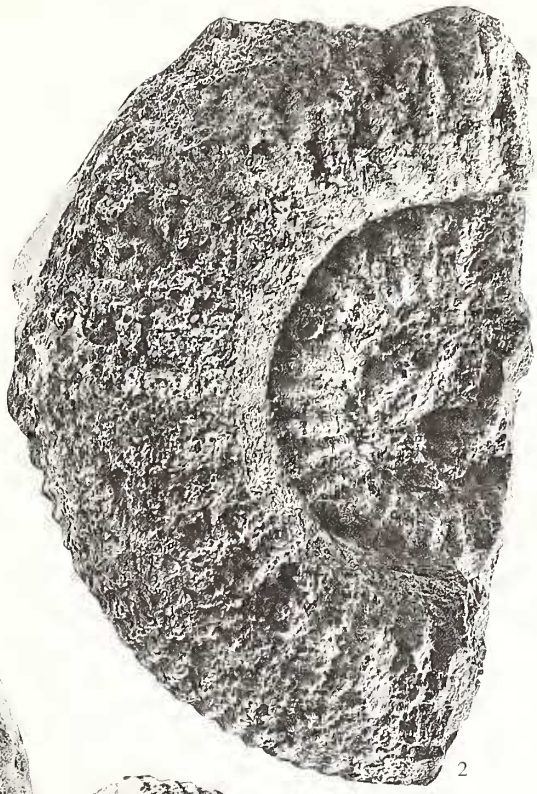

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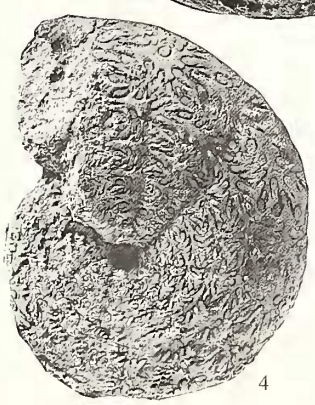

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GALÁCZ, *Emileia*, *Stephanoceras*, *Calliphylloceras*

Suborder LYTOCERATINA Hyatt, 1889
Superfamily LYTOCERATACEAE Neumayr, 1875
Family LYTOCERATIDAE Neumayr, 1875
Genus NANNOLYTOCERAS Buckman, 1905

Type species. Ammonites pygmaeus (d'Orbigny 1842–51, p. 391, pl. 129, figs 12 and 13), by original designation of Buckman (1905, p. 151).

Nannolytoceras polyhelictum (Böckh, 1881)

Plate 3, fig. 2

v 1881 *Lytoceras polyhelictum* Böckh, p. 35, pl. 1, figs 2 and 3.
1964 *Eurystomiceras polyhelictum* (Böckh); Pugin, p. 42, pl. 3, fig. 7; text-fig. 8 (*cum syn.*).
1980 *Namolytocerns polyhelictum* (Böckh); Galácz, p. 51, pl. 10, fig. 2; pl. 11, fig. 1; text-figs 39–41 (*cum syn.*).

Material. Four poorly preserved, fragmentary internal moulds.

Measurements.

	MDm	Dm	Wh	Wb	Ud
J9476	61	61	18 (29·5)	18 (29·5)	29 (47·5)
J9475	54	54	15 (28)	15 (28)	26·5 (49)
		41	13·5 (33)	13·5 (33)	19·5 (47·5)

Description. The figured specimen is a small fragment. The umbilicus is wide, the whorl section high-oval, becoming subcircular on the body chamber. The umbilical wall and the flanks are rounded, the venter is slightly arched. The whorls are smooth, only constrictions are present. The number of constrictions is five on the outermost whorl. They are projected and slightly curved, crossing the venter perpendicularly. The frontal margin of the constrictions is inflated. No entire body chamber is preserved, thus the aperture cannot be seen. Suture line is not visible.

Remarks. This species was discussed (Galácz 1980, p. 51) on the basis of bigger and better preserved material. The Közöskút specimens match these previously studied forms well.

Distribution. The type (Böckh 1881, pl. 1, fig. 1) came from the *Niortense* Zone of the Mecsek Mountains, southern Hungary, but from there and elsewhere, *Humphriesianum* Zone occurrences were also mentioned. The specimens described here came from Beds 8, 4 and 2, i.e. from the middle to the upper part of the *Humphriesianum* Zone.

Suborder AMMONITINA Hyatt, 1889
Superfamily HILDOCERATACEAE Hyatt, 1867
Family SONNINIIDAE Buckman, 1892
Genus DORSETENSIA Buckman, 1892

Type species. Ammonites Edouardianus (d'Orbigny 1844, p. 392, pl. 130, figs 3–5), by original designation of Buckman (1892 p. 302).

Dorsetensia subtecta Buckman, 1892

Plate 2, fig. 4; Text-fig. 3B

v 1892 *Dorsetensia subtecta* Buckman, p. 309, pl. 54, figs 3–5; pl. 55, figs 1 and 2.
p. 1935 *Dorsetensia subtecta* Buckman; Dorn, p. 103, pl. 21, fig. 2; pl. 25, fig. 7; pl. 29, fig. 4; pl. 8, figs 9 and 10 only.
?1937 *Witchellia* (*Dorsetensia*) *subtecta* Buckman; Horwitz, p. 254, pl. 10, fig. 4.
?1937 *Witchellia subtecta* Buckman; Gillet, p. 67, text-fig. 49.
1943 *Dorsetensia subtecta* Buckman; Roché, p. 13, pl. 2, fig. 2.

1949 *Dorsetensia Thilense* Maubeuge, p. 172, pl. 12; text-figs on p. 172.
1951 *Dorsetensia subtecta* Buckman; Maubeuge, p. 34, pl. 12, fig. 2.
1951 *Dorsetensia* cf. *subtecta* Buckman; Maubeuge, p. 36, pl. 10, fig. 3.
?1961 *Dorsetensia* sp. aff. *thilense* Maubeuge, p. 71, fig. on p. 72.
1967 *Dorsetensia subtecta* Buckman; Kopik, p. 27, pl. 7, fig. 5; pl. 8, figs 1 and 2; pl. 9, fig. 1; text-figs 13 and 14.
1968 *Dorsetensia liostraca subtecta* Buckman; Huf, p. 103, pls 41–47.
non 1973 *Dorsetensia* cf. *D. subtexta* [*sic*!] Buckman; Imlay, p. 71, pl. 28, figs 1–7; pl. 29, fig. 7.
1977 *Dorsetensia* cf. *subtecta* Buckman; Parsons, p. 212, pl. 13, fig. 1.
1983 *Dorsetensia* (*Dorsetensia*) *subtecta* Buckman; Pavia, p. 61, pl. 5, figs 3 and 8.
?1984 *Dorsetensia subtecta* Buckman; Dietl, Franz and Reis, p. 310, text-fig. 2/1.
1985 *Dorsetensia subtecta* Buckman; Schlegelmilch, p. 66, pl. 20, fig. 3.

Material. A single, well preserved, but partly fragmentary internal mould.

Measurements.

	MDm	Dm	Wh	Wb	Ud	Wh/Wb
J9494	210	210	88 (42)	38 (18)	52 (25)	2·31
		156	70·5 (45)	31 (20)	36 (23)	2·27

Description. A large specimen with a relatively wide, shallow umbilicus. The whorl section is high, compressed. The umbilical wall is flat, oblique, forming a distinct shoulder with the flank. The lateral side is slightly convex, and forms a ventro-lateral edge with the narrow, tectiform venter. The internal mould bears a blunt ventral keel showing traces of the hollow keel of the shell. The preserved parts of the inner whorls have no traces of ribbing. The specimen is septate up to 150 mm diameter, and has preserved body chamber of nearly half a whorl. The terminal part of the last whorl, with the aperture, is missing.

The suture line is partially visible (Text-fig 3B). This shows finely serrated lobes and saddles as compared to those usual in the genus. However, the broad lateral lobe indicates the characteristic *Dorsetensia*-type suture.

Remarks. D. subtecta is distinguished from the similar, large *Dorsetensia* by its relatively wide umbilicus and high, flattened, nearly parallel flanks. Huf (1968, p. 103) gave a detailed discussion on the variations. The whole group, with its size, style of ornament on the early whorls and septicarinate venter shows affinities to Sonniniinae, and may be better placed in the genus *Sonninites* Buckman (J. Callomon, pers. comm. 1986).

The Közöskút specimen is very similar to the large forms described by Maubeuge (1951, p. 34), the closest form being the variety previously designated as *D. thilense* (Maubeuge 1949, p. 172). Another very similar form is that described by Hoyermann (1917, p. 39) and refigured later by Huf (1968, pl. 43, fig. 1*c*; pl. 44, fig. 1).

Distribution. D. subtecta, like other large *Dorsetensia* species, usually occurs in the lower part of the *Humphriesianum* Zone. In the type area of Oborne, Dorset, Parsons (1976, pp. 121, 131) collected topotypes in association with typical *Romani* Subzone ammonites. Higher occurrences within the *Humphriesianum* Zone are also known (see e.g. Pavia 1983, p. 61). The Közöskút specimen came from Bed 6, i.e. from the higher part of the *Humphriesianum* Subzone.

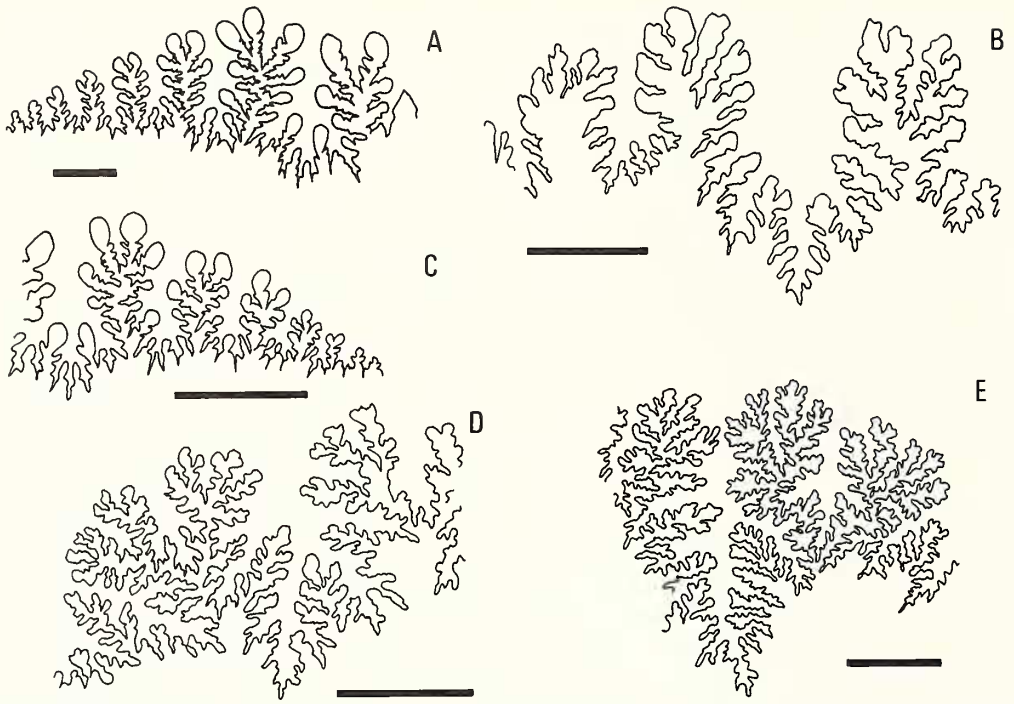
Superfamily STEPHANOCERATACEAE Neumayr, 1875
Family OTOITIDAE Mascke, 1907
Genus EMILEIA Buckman, 1898

Type species. Ammonites brocchii (J. Sowerby, 1818, p. 233, pl. 202), by original designation of Buckman (1898, p. 456).

Emileia sp. indet.

Plate 1, fig. 1

Material. A single, fragmentary specimen (J9469), but relatively well preserved. Measurements cannot be made.



TEXT-FIG. 3. Suture lines of A, *Calliphylloceras heterophylloides* (Oppel), J9477, Bed 1; B, *Dorsetensia subtecta* Buckman, J9494, Bed 6; C, *Holcophylloceras zignodianum* (d'Orbigny), J9486, Bed 1; D, *Stephanoceras* (*Stephanoceras*) *scalare* Weisert, J9472, Bed 10; E, *Stephanoceras* (*Stephanoceras*) *triplex* Weisert, J9497, Bed 10. Scale bars 10 mm.

Description. A small fragmentary inner part, with a recrystallized and manganese-coated partly preserved shell. The specimen is cut by subsolution, which removed more than half the ammonite.

The umbilicus is very narrow, the whorl section is inflated with oblique, rounded umbilical wall and arched flank and venter. The dense ribbing consists of blunt, straight, rectiradiate primary ribs reaching about one-third of the whorl height. The secondaries arise from the slightly elongated tubercles at the termination of the inner ribs. There are seventeen primary and fifty-nine secondary ribs on the 225° segment of the preserved outer whorl. The specimen is septate throughout, thus chambered part and the body chamber have been broken off. Only small parts of the suture line can be seen.

Remarks. The single, fragmentary specimen is insufficient for specific identification; however, some visible features suggest closer affinities. The very small umbilicus and the numerous, long primary

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EXPLANATION OF PLATE 2

Fig. 1. *Stephanoceras* (*Stephanoceras*) *leoniae* Schmidtill and Krumbeck. J9489; Közöskút; Bed 9, *Stephanoceras humphriesianum* Subzone; lateral view of a nearly complete specimen, ×1.

Fig. 2. *Holcophylloceras zignodianum* (d'Orbigny). J9468; Közöskút; Bed 1, *Teloceras blagdeni* Subzone; lateral view, ×0·7.

Fig. 3. *Stephanoceras* (*Stephanoceras*) *mutabile* (Quenstedt). J9486; Közöskút; Bed 5, *Stephanoceras humphriesianum* Subzone; lateral view, ×1.

Fig. 4. *Dorsetensia subtecta* Buckman, J9494; Közöskút; Bed 6, *Stephanoceras humphriesianum* Subzone; lateral view, ×0·6.

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GALÁCZ, *Stephanoceras*, *Holcophylloceras*, *Dorsetensia*

ribs closely resemble the inner whorls of *Emileia greppini* Maubeuge, 1961. This species is usually represented by large specimens, but the type series (Greppin 1898, pls 1–3) also contain incomplete forms, showing the characteristic juvenile features.

Distribution. The type of *E. greppini*, according to Greppin (1898, p. 31) was collected from the 'Sauzei-Schichten' at Liestal, Switzerland. The *Sauzei* Zone age of these beds was supported recently by Ohmert *et al.* (1982, pp. 153–154). Parsons (1974, p. 159) cited *E. greppini* as a species characteristic in the *Sauzei* Zone.

In the Közöskút sequence the genus *Emileia*, even without closer identification, undoubtedly indicates the presence of the *Sauzei* Zone. This representation confines to a single bed (Bed 11), because the underlying Bed 12 yielded Toarcian ammonites, whereas Bed 10 above contained *Humphriesianum* Zone ammonites.

Family STEPHANOCERATIDAE Neumayr, 1875
Subfamily STEPHANOCERATINAE Neumayr, 1875
Genus and subgenus STEPHANOCERAS Waagen, 1869

Type species. Ammonites Humphriesianus (J. de C. Sowerby, 1825, p. 161, pl. 500, fig. 1), by subsequent designation of Buckman 1898, p. 454.

Stephanoceras (*Stephanoceras*) *triplex* Weisert, 1932

Plate 3, fig. 1; Text-fig. 3E

1932 *Stephanoceras triplex* Weisert, p. 52, pl. 16, fig. 1.
non 1961 *Stephanoceras* cf. *triplex* Weisert; Maubeuge, p. 108, fig. on p. 109.
v 1971 *Stephanoceras* (*Stephanoceras*) aff. *triplex* Weisert; Morton, p. 279, pl. 46, figs 1 and 2; pl. 47, figs 1 and 2.
1985 *Teloceras* (?) *triplex* Weisert; Schlegelmilch, p. 78, pl. 27, fig. 7.

Material. Two relatively well preserved, but fragmentary specimens.

Measurements.

	MDm	Dm	Wh	Wb	Ud	Pr	S
J9497	225	225	60 (26·5)	94 (42)	114 (51)	—	—
		152	39 (25·5)	?60 (?39·5)	76 (50)	39	86
J9499	225	191	51 (27)	88 (46)	94 (52)	40	95
		152	40 (26·5)	64 (42)	76 (50)	36	92

Description. Large, robust form with moderately wide umbilicus. The figured specimen is a well preserved internal mould with fragmentary body chamber and manganese coating which has partly replaced the original shell. The width of the umbilicus remains constant (*c.* 50%) with growth. The whorl section is subcircular and hardly varies during growth. The umbilical slope and the lateral side are convex, and the venter is evenly rounded. The sculpture is a dense, regular ribbing. The primary ribs arise from the umbilical seam. The radial, slightly backwardly arched primaries are rounded on the internal mould, but probably sharp on the test. The primaries end in pointed, radially somewhat elongated, relatively small tubercles. These are situated at half of the height in the inner whorls, while the position of the tubercle row is gradually displaced lower, to about one-third the height of the body chamber. The number of primary ribs is fairly constant, i.e. 35–40 per whorl, but

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EXPLANATION OF PLATE 3

Fig. 1. *Stephanoceras* (*Stephanoceras*) *triplex* Weisert. J9497; Közöskút; Bed 10, *Stephanoceras humphriesianum* Subzone; lateral view, × 1.

Fig. 2. *Nannolytoceras polyhelictum* (Böckh.) J9475; Közöskút; Bed 2, *Teloceras blagdeni* Subzone; lateral view, × 1.

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GALÁCZ, *Stephanoceras*, *Nannolytoceras*

somewhat increases on the outer whorls. Generally two secondary ribs arise from the tubercles, but eight to ten triplications may appear on each whorl, and additional intercalatories, starting at the row of the tubercles, also occur. The secondary ribs are rounded and projected slightly throughout the whorls and pass straight across the venter. The length of the body chamber cannot be measured, because apertural parts are missing in the studied material. The phragmocone ends at *c.* 150 mm diameter, and the longest preserved body chamber fragment comprises nearly one whorl.

The suture line is characteristic (Text-fig. 3E), showing narrow saddles and rather wide lobes. The lateral lobe is remarkably long and deeply incised. The umbilical elements are retracted.

Remarks. S. triplex belongs to the broadly-whorled *Stephanoceras brodiaei* group. The relatively wide umbilicus, the generally biplicate ribbing, the rather small tubercles, and the extremely long lateral lobe in the suture are all characteristic.

The species name '*triplex*' does not appear in the published work of Mascke (1907), in spite of the reference made by Weisert (1932, p. 52). Thus Weisert should be regarded as the author of this species, a procedure followed previously by others (e.g. Morton 1971, p. 279). The lectotype is the original of plate 16, figure 1 in Weisert (1932). This is a smaller specimen (see Schlegelmilch 1985, pl. 27, fig. 7), but nevertheless closely comparable with the inner whorls of the Közöskút forms. The number of the primaries is somewhat lower in the lectotype; on the other hand that form shows some irregularities in its sculpture. The form described by Maubeuge (1961, pp. 108–109 as *S.* cf. *triplex*) is not conspecific because of the wider whorls, somewhat narrower umbilicus and denser secondary ribbing. The forms figures by Morton (1971, pl. 46, figs 1 and 2; pl. 47, figs 1 and 2), though fragmentary and crushed, are near to the typical *S. triplex*.

Distribution. Stephanoceras (*S.*) *triplex* is a common and frequently recorded element in the *Humphriesianum* Zone faunas. Its subzonal distribution is to be ascertained. The Közöskút specimens came from Bed 10, i.e. from the *Humphriesianum* Subzone.

Stephanoceras (*Stephanoceras*) *scalare* Weisert, 1932

Plate 4, fig. 4; Text-fig. 3D

v 1849	*Ammonites Humphriesianus*; Quenstedt, p. 180, pl. 14, fig. 10.
1858	*Ammonites Humphriesianus plicatissimus* Quenstedt, p. 298, pl. 54, fig. 3.
p. 1887	*Ammonites Humphriesianus*; Quenstedt, p. 531, pl. 65, fig. 15 (only).
1932	*Stephanoceras scalare* Mascke; Weisert, p. 143, pl. 16, fig. 2; text-figs 7 and 8.
1937	*Stephanoceras scalare* Mascke; Horwitz, p. 261, pl. 11, fig. 3.
?1938	*Stephanoceras scalare* Mascke *em.* Weisert; Schmidtill and Krumbeck, p. 330, pl. 13, fig. 2; text-fig. 5.
p. 1938	*Stephanoceras auerbachense* Schmidtill and Krumbeck, p. 339, pl. 13, fig. 5 (only).
1946	*Cadomites Bigoti* Munier-Chalmas; Gardet and Gérard, p. 34, pl. 8, fig. 1.
1961	*Stephanoceras* (*Stephanoceras*) *scalare* Mascke *em.* Weisert; Krymholz, p. 112, text-fig. 14.
non 1969	*Stephanoceras* cf. *scalare* Mascke; Maubeuge, p. 71, fig. on p. 71.
1973	*Stephanoceras* cf. *scalare* Mascke; Myczynski, p. 91, pl. 11, fig. 1; pl. 12, fig. 1.
1982	*Stephanoceras* (*Stephanoceras*) *scalare* Mascke *em.* Weisert; Azarian, p. 83, pl. 14, fig. 2; pl. 16, fig. 4; pl. 17, fig. 5.
1983	*Stephanoceras* (*Stephanoceras*) *scalare* Mascke *emend.* Weisert; Sandoval, p. 235, pl. 16, fig. 1.
p. 1983	*Stephanoceras* (*Stephanoceras*) *scalare* Weisert (Mascke); Pavia, p. 89, pl. 12, fig. 5 (only).
?1985	*Stephanoceras* (*Stephanoceras*) *scalare* Weisert; Rostovtsev, p. 141, pl. 39, fig. 1.
non 1985	*Stephanoceras scalare* Weisert; Fernandez López, p. 283, pl. 29, fig. 1.
1985	*Stephanoceras* (*Stephanoceras*) *scalare* Loewe; Schlegelmilch, p. 70, pl. 22, fig. 4.

Material. Four specimens, two nearly entire internal moulds, one phragmocone and one body chamber fragment.

Measurements.

	MDm	Dm	Wh		Wb	Ud		Pr	S
J9484	270	225	45	(20)	40 (18)	141	(65)	—	—
		141	34	(23)	?30 (?20·5)	81	(55)	47	—
J9498	250	235	45	(19)	?40 (?17)	153	(65)	—	—
		200	42	(21)	?40 (?20)	125	(62·5)	64	121
		136	33	(24)	?30 (?22)	71	(52)	47	—
J9483	131	131	32·5	(25)	32 (24·5)	72	(55)	48	—
		112	31	(27·5)	32 (28·5)	56·5	(50·5)	42	—
		89	30	(33·5)	30 (33·5)	43·5	(49)	37	—
		70	21	(30)	21 (30)	29·5	(42)	—	—
		52	18	(34·5)	19 (36·5)	20	(38·5)	—	—

Description. Large, planulate, serpenticone form. The figured specimen is an almost complete, well preserved internal mould with partial manganese coating, which replaces the original shell. The umbilicus is very wide and gradually opens with individual growth: its width is *c.* 45–50 % in the inner, and 60–65 % in the outermost whorls. The shape of the whorl section also varies with growth, being somewhat depressed-circular in the inner whorls and compressed-oval on the body chamber. The umbilical slope is short and convex, the lateral sides are also convex, becoming slightly flattened on the outer whorls. The venter is convex and wider in the inner whorls. The ornament consists of dense ribbing. The inner ribs arise at the umbilical seam, run radially in the inner, and become slightly backwardly arched in the outer whorls. The number of primary ribs increases with growth: 30–35 in the inner whorls (at 50–70 mm diameter), and 60–65 in the outer whorls (at *c.* 190 mm diameter). The primary ribs end in slightly elongated, small, pointed tubercles around the lower third of the flanks. The long secondary ribs arise from the tubercles, are radial in the inner whorls and slightly prorsiradiate on the body chamber. Here the number of the secondary ribs is smaller, two per primary. In the outermost whorl simple ribs and intercalatories appear, arising freely at the level of the tubercles. The rounded secondaries run straight across the venter. The body chamber is very long, beginning at 130–140 mm diameter and consisting of more than one and a half whorls. The apertural part is missing in all specimens.

Entire suture line cannot be seen in either specimen. The clearly visible sutural portions show moderately deep, relatively broad lateral, and moderately retracted umbilical lobes (Text-fig. 3D.).

Remarks. The synonymy of early citations of this form was discussed in detail by Pavia (1983, pp. 89–91). However, the origin of the species' name is mysterious. In Weisert (1932, p. 143) the whole name is '*Stephanoceras scalare* Mascke sp. 1903, *em.* Weisert 1931'. Even the 1903 date is strange, because although this is the year when Mascke defended his thesis, the work itself was published in 1907, so this is the valid citation date. On the other hand, the species' name '*scalare*' does not appear in the publication. This is probably why subsequent authors used the *S. scalare* Mascke or the *S. scalare* Weisert versions.

The photograph of the holotype was first published by Weisert (1932, pl. 16, fig. 2). Nevertheless, Weisert (1932, p. 143) had at least one additional specimen, from which measurements were recorded. These show that this specimen is probably not conspecific. More recently Pavia (1983, pl. 12, fig. 5) published a photograph of the plaster cast of the holotype and also recorded its dimensions. However, the three other forms figured by Pavia (1983, pl. 12, figs 1, 3, 4) differ significantly from the type in size and sculpture and thus are regarded here as non-conspecific.

Fragments of *S. scalare* were figured by Horwitz (1937) and by Myczynski (1973) from the Pieniny Klippen Belt, Polish Carpathians, and by Gardet and Gérard (1946, pl. 8, fig. 1, as '*Cadomites Bigoti*') from the Middle Atlas Range. One of the best descriptions of the species is by Krymholz (1961, p. 112), who recorded it from the Northern Caucasus. Good specimens were described by Azarian (1982) and a fragment of a very similar form was figured by Rostovtsev (1985). Sandoval (1983, p. 235, pl. 16, fig. 1) recorded the species from the Betic Cordilleras. The identity of the two specimens figured by Schmidtill and Krumbeck (1938, pl. 13, fig. 2; text-fig. 5; pl. 13, fig. 5 – the latter as *Stephanoceras auerbachense*) is doubtful because of their poor preservation. The ammonite figured by Maubeuge (1969, pl. 71, No. 66959, as *S.* cf. *scalare*) is a badly preserved fragmentary specimen with coarse ribbing and short, bulky primaries.

Westermann and Riccardi (1979, p. 155) regarded, with question marks, *S. scalare* (and other *Stephanoceras* species) as synonyms of *S. pyritosum* (Quenstedt). They published a photograph of the type of this latter species: from this it is clear that the number of the primary ribs remains low throughout the whorls, whereas it is higher in all stages in typical *Stephanoceras scalare*.

The features mentioned in the description (i.e. wide umbilicus, dense ribbing, whorl section becoming compressed on the outermost whorl, etc.) clearly distinguish this form from other species of the *Stephanoceras humphriesianum* group. *S. humphriesianum* itself is a rare ammonite, which can be characterized by shorter inner ribs with clearly distinguished, rounded tubercles and regularly three, or rarely four, secondaries. Another, similar form of this group is *S. rhytus* (Buckman 1921, pl. 250). However, this species is characterized by strongly rectiradiate primaries and strongly projected boundles of secondaries, and these result in a distinguishing, marked break in the sculpture.

Distribution. *S. scalare* is apparently a widely distributed *Stephanoceras*. The type probably came from the *Humphriesianum* Zone of Bopfingen, South Germany (see Pavia 1983), the other described forms are similarly recorded from the *Humphriesianum* Zone. Parsons (1976, pp. 131, 134) mentioned *S.* cf. *scalare* from the English *Humphriesianum* and *Romani* Subzones. Sandoval (1983, p. 236) found the species in the upper part of the *humphriesianum* Zone. Thus the species occurs in wide geographic distribution from North Africa to the Caucasus, both in Mediterranean and northwest European faunas, in the *Humphriesianum* Zone.

The Közöskút species came from Beds 10 and 4 of the *Humphriesianum* Subzone.

Stephanoceras (*Stephanoceras*) sp.

Plate 1, fig. 3.

Material. A single, well-preserved, entire, but somewhat corroded specimen.

Measurements.

	MDm	Dm	Wh	Wb	Ud	Pr
J9488	169	159	35 (22)	38 (24)	99 (62)	—
		130	30 (23)	34 (26)	73·5 (56·5)	—
		107	27 (25)	37 (34·5)	57·5 (54)	41

Description. A relatively large serpenticone internal mould. The umbilicus is shallow and extremely wide, especially on the outer whorls. The whorl section is subcircular, high-oval on the body chamber. The umbilical wall is convex, the flanks are slightly rounded, and the venter is highly arched. Maximum width can be measured around the lower third of the whorl height. The ornament is formed by dense ribbing. The primary ribs are rounded and short, at about one-quarter their height they branch into three or rarely two secondaries. The secondary ribs are straight, rounded and slightly rectiradiate on the body chamber. At 107 mm diameter the number of primary ribs is forty-one, and here the primary:secondary rib ratio is 18:48 for a half whorl. On the visible inner whorls the primary ribs are longer, prorsiradiate, and terminate in tubercles. The body chamber occupies the entire last whorl, with a slightly expanding, smooth collar.

The entire suture line cannot be seen, but the visible parts show typical *Stephanoceras*-like divided saddles, deep lateral lobe and strongly retracted umbilical lobe.

EXPLANATION OF PLATE 4

Fig. 1. *Stephanoceras* (*Normannites*) sp. aff. *fortis* Pavia. J9480; Közöskút; Bed 3, *Teloceras blagdeni* Subzone; lateral view of a complete adult microconch, ×1.

Figs 2 and 3. *Stephanoceras* (*Normannites*) *orbignyi* Buckman. J9463; Közöskút; Bed 3, *Teloceras blagdeni* Subzone; 2, lateral and 3, ventral views of an adult microconch, ×1.

Fig. 4. *Stephanoceras* (*Stephanoceras*) *scalare* Weisert. J9498; Közöskút; Bed 10, *Stephanoceras humphriesianum* Subzone; lateral view of an almost complete specimen, ×0·7.

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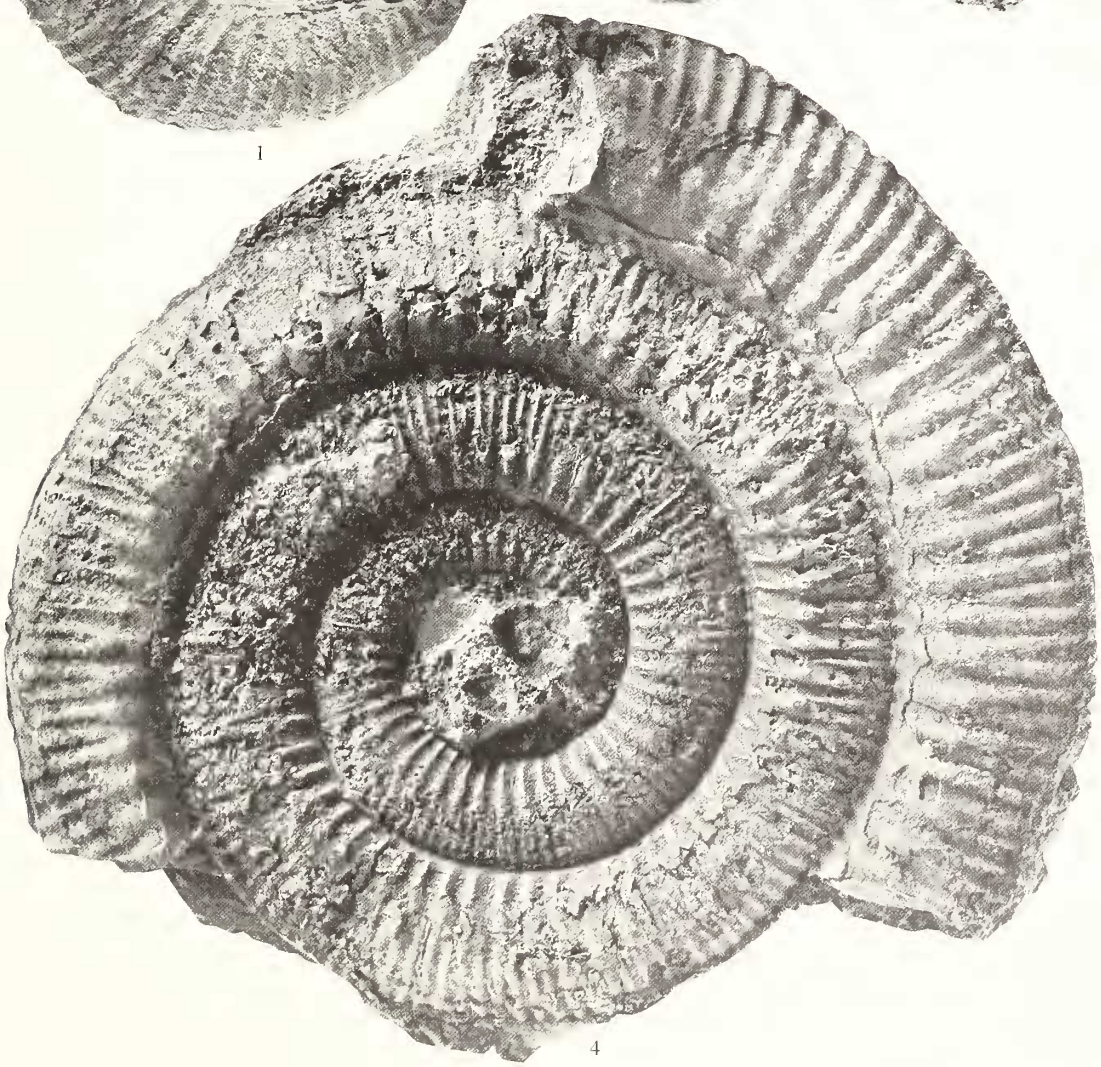

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GALÁCZ, *Stephanoceras*

Remarks. Because of incomplete preservation, this single specimen is insufficient for specific determination. A similar form is that described by Pavia (1983, p. 97, pl. 14, fig. 6) from the *Humphriesianum* Zone of Bayeaux. He assigned this specimen to *Stephanoceras tenuicostatum*; however, this latter species is smaller, has distant and longer primary ribs with tubercles throughout the internal mould of the body chamber. The individual features of the Normandy species are close to those of the Közöskút form; nevertheless, designation of a new species would need further material.

Distribution. The Közöskút specimen came from Bed 9, i.e. from the *Humphriesianum* Subzone. The Normandy specimen was collected from the condensed *Humphriesianum* Zone of Bayeux.

Stephanoceras (*Stephanoceras*) *leoniae* Schmidtill and Krumbeck, 1938

Plate 2, fig. 1

1938 *Stephanoceras leoniae* Schmidtill and Krumbeck, p. 343, pl. 11, fig. 4.
non 1949 *Stephanoceras leoniae* Schmidtill and Krumbeck; Maubeuge, p. 173, pl. 13.

Material. Two incomplete, relatively well preserved specimens.

Measurements.

	MDm	Dm	Wh	Wb	Ud	Pr
J9473	117	117	32·5 (27·5)	32 (27·5)	58 (49·5)	—
		88·5	28·5 (32)	31 (35)	38 (43)	—
J9489	113	113	34 (30)	35 (31)	53 (47)	—
		92	31 (33·5)	36 (39)	42 (45·5)	31

Description. A relatively small stephanoceratid. The figured specimen is a corroded internal cast with partial manganese coating. The umbilicus is moderately wide, the whorl section is circular with convex umbilical side and flanks, and with evenly arched venter. The sculpture is only partially visible. The straight, slightly prorsiradiate primary ribs arise at the umbilical seam and their number somewhat increases on the outer whorl. The primaries are slightly strengthened at the lower third of the flanks, without forming true tubercles. At this level the slightly curved, generally radial, rounded secondary ribs appear. Their strength is variable; those arising from the thickened primaries are stronger, whereas those starting freely are somewhat weaker. These differences disappear towards the venter. The better preserved half of the penultimate whorl bears fifteen primary and about forty-eight secondary ribs. The slightly contracted body chamber occupies two-fifths of the preserved last whorl; the aperture is missing. The suture line cannot be seen.

Remarks. The type (Schmidtill and Krumbeck 1938, pl. 11, fig. 4) is an incomplete, poorly preserved specimen of 90 mm diameter. The original description mentioned the dense ribbing and strong secondaries as characteristic. The type specimen is wholly septate, but the excentric umbilical seam indicates that the missing part was probably the body chamber. Thus this is a relatively small form, comparable to the Közöskút specimens. The ribbing is also similar, showing the smoothed tubercles mentioned in the original description.

The ammonite assigned to this species by Maubeuge (1949, pl. 13) differs in being more evolute, compressed (its Wb:Wh ratio is 0·85, as against 1·1 of the type) and having lowly situated, slightly elongated tubercles instead of real primary ribs.

Sandoval (1983, pp. 241–243) and also Schlegelmilch (1985, p. 72) regarded *S. leoniae* as a synonym of *Stephanoceras zogenreuthense*, another species of Schmidtill and Krumbeck. However, the type of this latter is different, having denser ribbing, stronger primaries and distant tubercles.

Distribution. The horizon of the type is uncertain within the 'Humphriesianum-Schichten' of South Germany. The Közöskút specimens came from Bed 9, i.e. from the *Humphriesianum* Subzone.

Stephanoceras (*Stephanoceras*) *mutabile* (Quenstedt, 1886)

Plate 1, fig. 2; Plate 2, fig. 3

1886 *Ammonites Humphriesianus mutabilis* Quenstedt, p. 537, pl. 66, fig. 5.
non 1909 *Stephanoceras mutabile* Quenstedt; Lissajous, p. 181, pl. 6, fig. 14.
1932 *Stephanoceras mutabile* Quenstedt; Weisert, p. 153, pl. 17, fig. 6; text-figs 15 and 16.
v 1971 *Stephanoceras* (*Stephanoceras*) *mutabile* Quenstedt; Morton, p. 273, pl. 40, figs 5–10; text-fig. 2A.
?1983 *Stephanoceras* (*Stephanoceras*) *mutabile* (Quenstedt); Sandoval, p. 238, pl. 17, fig. 3; text-fig. 99B.
p. 1983 *Stephanoceras* (*Stephanoceras*) gr. *umbilicum* (Quenstedt); Pavia, p. 100, pl. 12, fig. 2 (only).
1985 *Stephanoceras umbilicum* (Quenstedt); Fernandez López, p. 278, pl. 27, fig. 3; text-fig. 29H.
1985 *Stephanoceras* (*Stephanoceras*) *mutabile* (Quenstedt); Schlegelmilch, p. 72, pl. 25, fig. 1.

Material. Two incomplete and fragmentary internal moulds.

Measurements.

	MDm	Dm	Wh	Wb	Ud	Pr/2	S/2
J9496	115	115	40 (35)	50 (43·5)	49 (43)	18	47
		48	30 (35)	37 (43·5)	35 (41)	—	—
J9486	94	94	32 (34)	?44 (?47)	33·5 (35·5)	18	51

Description. Medium-sized forms. The two figured specimens are fragmentary, the bigger is a corroded internal mould, the smaller is a similarly badly preserved specimen, with partial manganese coating. The umbilicus is relatively narrow and deep, its width is constant during growth. The whorl section is subcircular, with steep, slightly convex umbilical walls and widely arched venter. The sculpture consists of dense ribbing. The primary ribs arise from the umbilical seam, are rounded on the internal mould, but sharp on the shell. The number of the slightly rectiradiate, backwardly arched primaries is eighteen and sixteen on the preserved last and penultimate half-whorl of the bigger specimen. The primary ribs end in sharp, circular tubercles at the lower third of the flank. The tubercles are weaker on the internal mould. Two to three secondary ribs start from the tubercles, i.e. there are forty-seven secondaries on the last half whorl. The secondary ribs are radial, only slightly curving. The smaller specimen is wholly septate, the larger one shows a very short part of the body chamber, which begins at *c.* 106 mm diameter. The suture line cannot be seen clearly.

Remarks. Quenstedt (1886–87, pl. 66, fig. 5) figured only the ventral view of the holotype; later Weisert (1932, pl 17, fig. 6) published a photograph of the lateral side. More recently Schlegelmilch published both views of the holotype (1985, pl. 25, fig. 1). These show clearly that its characteristics are the relatively narrow umbilicus and the dense ribbing with low tubercle row (see also Morton 1971, p. 274). Pavia (1983, pp. 100–101) regarded *S. kreter* (Buckman), *S. mutabile* (Quenstedt) and *S. umbilicum* (Quenstedt) as a single group, suggesting a transient position for *S. mutabile*, on the basis of the umbilical width and the length of the primary ribs.

An additional feature of the species is its relatively small size. As Westermann and Riccardi pointed out (1979, p. 158), a part of the last whorl of the holotype is body chamber. The Közöskút specimens, though fragmentary, correspond well with the figures of the holotype. These are also small forms: one of the specimens shows the end of septation at 106 mm diameter.

S. mutabile is a commonly recorded but rarely illustrated species. The ammonite figured by Lissajous (1907–1912, pl. 6, fig. 14) from the *Parkinsoni* Zone is clearly different, probably being the inner whorls of a *Cadomites* sp. Good figures were published by Schmidtill and Krumbeck (1938). Sandoval (1983, pl. 17, fig. 3) figured a specimen of strongly corroded outer whorls, thus difficult to identify. However, the recorded dimensions and the cross-section show a closely allied form.

Distribution. The holotype came from the middle part of the *Humphriesianum* Zone (see Morton 1971, p. 275, and Pavia 1983, p. 102). Other records indicate the same stratigraphic level. Parsons (1976, p. 139) cited the species as a characteristic form in the *Humphriesianum* Subzone. The Közöskút specimens came from Beds 9 and 5 of the *Humphriesianum* Subzone.

Stephanoceras (*Stephanoceras*) *sturanii* Pavia, 1983

Plate 1, fig. 5

1983 *Stephanoceras* (*Stephanoceras*) *sturanii* Pavia, p. 94, pl. 13, figs 4 and 6.

Material. Two incomplete, fragmentary specimens (J9461–J9462) of poor preservation. Precise measurements cannot be made.

Description. The figured specimen (J9461) is a fragmentary internal mould with subsolved inner whorls and an incomplete, slightly distorted body chamber. The umbilicus is narrow and deep in the inner whorls, becoming excentric and wide on the last whorl. The whorl section is subcircular with low, oblique umbilical wall rounding into the convex whorl-side without shoulder. The venter is widely arched. The ribbing is extremely dense, consisting of short, lamellar primaries, which end in radially elongated tubercles below the lower third of the flanks. From the tubercles arise the secondaries, which are sharp on the flanks and rounded on the venter. Both the primary and the secondary ribs are radial. On the preserved quarter of the last whorl there are seventeen primary and forty-one secondary ribs.

The suture line cannot be seen clearly, only the strongly retracted umbilical elements are visible.

Remarks. The specimens closely resemble the recently designated species of Pavia. With its narrowly coiled inner and middle whorls, excentric body chamber and very dense sculpture this is a species from an incompletely known group of Mediterranean stephanoceratids. Another member of this group is described above as *Stephanoceras* (*S.*) sp.

Description. The holotype of this species came from the *Blagdeni* Subzone of Digne, SE France, and Pavia (1983, pl. 13, fig. 4) described an additional specimen from the *Humphriesianum* Zone of Normandy. The Közöskút specimens came from Bed 3, i.e. the *Blagdeni* Subzone.

Subgenus NORMANNITES Munier-Chalmas, 1892

Type species. Normannites orbignyi Buckman, 1908 = *Ammonites Braikenridgii* d'Orbigny (non Sowerby), 1845, p. 400, pl. 135, figs 3 and 4.

Stephanoceras (*Normannites*) *orbignyi* Buckman, 1908

Plate 4, figs 2 and 3

v 1845 *Ammonites Braikenridgii* Sowerby; d'Orbigny, p. 400, pl. 135, figs 3 and 4 (only).
1908 *Normannites Orbignyi* Buckman, p. 146.
1927 *Normannites orbignyi* Buckman; Buckman, pl. 734, figs 1–3.
?1937 *Cadomites Orbignyi* Buckman; Gillet, p. 86, text-fig. 62.
?1937 *Normannites Orbignyi* Buckman; Horwitz, p. 265, pl. 12, fig. 2.
non 1939 *Normannites Orbignyi* Buckman; Roché, p. 219, pl. 1, fig. 5*a–b*.
1954 *Normannites* (*Normannites*) *orbignyi* Buckman, and subspp.; Westermann, pp. 135–152, pl. 5, figs 3 and 4; pl. 6, figs 1, 3–5; pl. 7, figs 1–5; pl. 8, fig. 1; text-figs 35–44.
non 1971 *Stephanoceras* (*Normannites*)? *orbignyi* Buckman; Morton, p. 282, pl. 51, figs 1 and 2.
non 1973 *Normannites* (*Normannites*) *orbigny* Buckman; Imlay, p. 82, pl. 41, figs 9, 10, 18, 20.
v 1978 *Normannites orbignyi* Buckman; Dietl et al., p. 10, text-fig. 3*a*.
1983 *Normannites* (s.s.) *orbignyi* Buckman; Pavia, p. 142, pl. 27, figs 3 and 5.
1985 *Normannites orbignyi* Buckman; Fernandez López, p. 321, pl. 34, fig. 1; text-fig. 36E.
1985 *Stephanoceras* (*Normannites*) *orbignyi* Buckman; Schlegelmilch, p. 73, pl. 25, fig. 3.

Material. A single, fragmentary internal mould of a damaged individual (J9463). Measurements would be difficult to make and misleading.

Description. The size of the specimen is *c.* 65 mm, and only the last half whorl is well preserved. The specimen is a small microconch with moderately wide umbilicus and somewhat depressed-oval whorl section. The well preserved part, which is the last half segment of the body chamber is slightly contracted with decreasing width

and height. The umbilical wall is steep, arched, the flanks are convex and the venter is widely arched. The sharp, prorsiradiate, slightly curved primary ribs arise at the umbilical seam. There are fifteen primaries on the last half whorl. The primary ribs end in radially elongated, pointed tubercles near the middle of the whorl height, giving rise to usually two secondary ribs. Some intercalatories also appear so the primary:secondary rib ratio is 13:34 on the last half whorl. An important feature is that the level of the tubercles gradually sinks on the body chamber. The secondaries are straight and cross the venter perpendicularly. Despite the bad preservation, some parts of the ornament are visible on the inner whorls. At *c.* 20 mm diameter the estimated number of primary ribs is twenty. The aperture cannot be seen properly, because the lappets are not preserved on the internal mould. However, the lateral inflation probably represents the base of the lappet. The suture line cannot be studied.

Remarks. Buckman (1908, p. 146) distinguished this species on the basis of the '*Ammonites Braikenridgii*' figure of d'Orbigny. He published the photograph of the type in 1927 (in 1909–30, pl. 734). Subsequently Westermann (1954, p. 136) named this specimen [unnecessarily] as the 'neotype'.

Westermann (1954), on the basis of whorl section and rib density, split *N. orbignyi* into four subspecies. However, these features are so variable in stephanoceratids in general, and *Normannites* in particular, that *N. orbignyi* is better regarded as a species of wide morphological variability (see also Westermann 1964). In this respect the Közöskút specimen is a form with a slightly wider umbilicus, but otherwise matching the type rather closely.

Of the rather common citations of *N. orbignyi*, the specimen of Horwitz (1937, pl. 12, fig. 2) is a very poorly preserved ammonite, insufficient for specific identification. The description and drawing of Gillet (1937, p. 86) is similarly insufficient to decide on specific identity. The specimen figured by Roché (1939, pl. 1, fig. 5) is a big form with an extremely wide umbilicus, and thus certainly not conspecific. The poorly preserved specimen of Morton (1971, pl. 51, figs 1 and 2), with large, elevated tubercles and dense secondary ribbing is also different.

Distribution. The type came from the *Epalxites* hemera of the *Humphriesianum* Zone of Dorset, which corresponds to the *Humphriesianum* Subzone (see Parsons 1976, p. 116). Other references mention the species from the *Blagdeni* Subzone and from the basal *Niortense* Zone. The Közöskút specimen came from Bed 3, i.e. from the *Blagdeni* Subzone.

Stephanoceras (*Normannites*) sp. aff. *fortis* Pavia, 1983

Plate 4, fig. 1

aff. 1983 *Normannites fortis* Pavia, p. 146, pl. 28, figs 2, 3, 6.

Material. A single, well preserved internal mould.

Measurements.

	MDm	Dm	Wh	Wb	Ud	Pr	S
J9480	77	77	27 (35)	31 (40)	35 (45)	35	68
		63·5	20 (31·5)	26 (41)	28 (44)	28	—

Description. A relatively large form. The umbilicus is moderately wide, opening slightly on the last half whorl. The whorl section is depressed, rounded, becoming more depressed near the end of the body chamber by contraction. The umbilical wall and the flanks are evenly convex, the ventral side widely arched. The sculpture consists of regular ribbing. The straight, prorsiradiate primary ribs are rounded on the internal cast, begin on the umbilical wall and reach the half of the flanks on the phragmocone, and the third on the body chamber, respectively. At the endings they are strengthened without tubercles, and branch into secondaries. There are thirty-five primaries on the outermost whorl, twenty-eight on the penultimate whorl and the same number on the preceding ones. The secondary:primary rib ratio is 68:35 on the last whorl, i.e. some singular ribs run onto the venter. The secondary ribs are straight and prorsiradiate, crossing the venter perpendicularly. The length of the body chamber is four-fifth of a whorl, the peristome is partially preserved, showing a slightly flared ventral ridge and short lateral lappets. Details of the suture line cannot be seen.

Remarks. Despite good preservation, identification with known *Normannites* species was apparently not possible. Special features are the low number of primary ribs in the middle whorls, the relatively numerous singular ribs on the outer whorl, and the complete lack of tubercles. This latter is characteristic to the '*Parallites*' of Westermann (1954). However, *Parallites* species show denser ribbing and narrower umbilicus. Of the *s.s. Normannites*, *N. vulgaricostatus pfaffi* Westermann (1954, p. 176, pl. 10, fig. 5) is similar, but this is smaller and has a narrower umbilicus and arched primary ribs. Closest similarity appears to be with *N. fortis*, a species of Pavia (1983, p. 146) from Digne. The most closely allied form is the paratype on plate 28, fig. 3 of Pavia. This differs from the holotype (*loc. cit.*, pl. 28, fig. 6) in having denser ribbing and undeveloped tubercles: features just present in the form described here. A very similar specimen was figured by Fernandez López (*Normannites* cf. *fortis*, 1985, pl. 33, fig. 3) from the *Banski* Subzone of the *Niortense* Zone from the Iberian Cordilleras.

Distribution. All specimens of *Normannites fortis* Pavia came from the uppermost *Humphriesianum* Zone; the Közöskút specimen was yielded by Bed 3, the *Blagdeni* Subzone.

Genus STEMMATOCERAS Mascke, 1907

Type species. Ammonites Humphriesianum coronatus Quenstedt, 1886, p. 539, pl. 66, fig. 1 = *Stephanoceras Frechi* Renz, 1904, p. 77, by original designation of Mascke, 1907, p. 30.

Stemmatoceras frechi (Renz, 1904)

Plate 5, figs 1–3

1886	*Ammonites Humphriesianus coronatus* Quenstedt, p. 539, pl. 66, fig. 11.
1904	*Stephanoceras Frechi* Renz, p. 77.
p. 1932	*Stemmatoceras coronatum* Quenstedt; Weisert, p. 159, pl. 18, fig. 4 (only).
1938	*Stemmatoceras coronatum* Quenstedt; Schmidtill and Krumbeck, p. 345, pl. 12, fig. 2.
1939	*Cadomites Quenstedti* nomen novum Roché, p. 205.
non 1951	*Stephanoceras quenstedti* Roché; Maubeuge, p. 64, pl. 14, fig. 2.
?1951	*Stephanoceras* aff. *quenstedti* Roché; Maubeuge, p. 64, pl. 5, fig. 4.
?1967	*Stemmatoceras* (*Stemmatoceras*) aff. *frechi* (Renz); Seyed-Emami, p. 136, pl. 4, fig. 22; pl. 15, fig. 3a–c.
non 1969	*Stemmatoceras* aff. *frechi* Renz; Pavia, p. 447, fig. 3/4.
non 1983	*Stemmatoceras* (*Stemmatoceras*) sp. cf. *S.* (*Stm.*) *frechi* Renz; Sandoval, p. 252, pl. 12, fig. 1; text-fig. 99I.
non 1985	*Stemmatoceras coronatum* (Quenstedt); Rostovtsev, p. 143, pl. 40, fig. 1; pl. 41, fig. 1.
1985	*Teloceras frechi* (Renz); Schlegelmilch, p. 77, pl. 27, fig. 6.

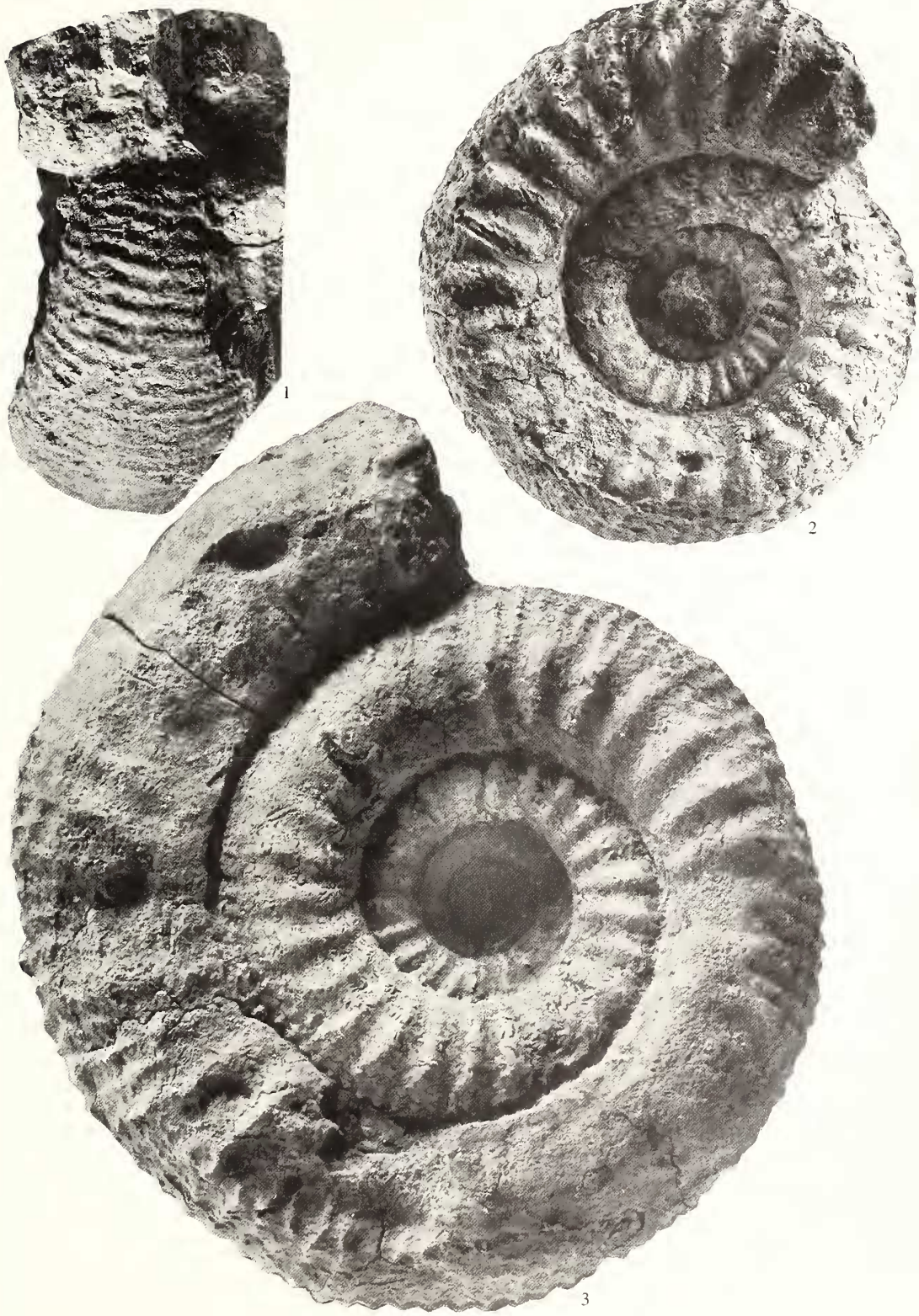
Material. Several well preserved specimens of which four were sufficient for detailed study.

Measurements

	MDm	Dm	Wh	Wb	Ud	Pr	S
J9482	145	131	29 (23)	?58 (?45)	68 (52)	35	87
		112	29 (26)	56 (50)	55 (49)	29	84
		83	24 (29)	46 (55·5)	38 (46)	26	—

EXPLANATION OF PLATE 5

Figs 1–3. *Stemmatoceras frechi* (Renz). 1 and 2, J9459; Közöskút; Bed 9, *Stephanoceras humphriesianum* Subzone; dorsal and lateral views of a smaller specimen. 3, J9482; Közöskút; Bed 4, *Stephanoceras humphriesianum* Subzone; lateral view of an adult form. All ×1.



GALÁCZ, *Stemmatoceras*

	MDm	Dm	Wh	Wb	Ud	Pr	S
J9479	133	133	32 (24)	68 (51)	71 (53·5)	—	—
		112	28 (25)	63 (56)	54·5 (48·5)	—	—
J9466	117	117	32 (24)	68 (51)	59 (50)	33	74
		100	32 (32)	58 (58)	52·5 (52·5)	31	—
J9495	90	90	25 (28)	54 (60)	42 (47)	29	72
		75	21·5 (29)	42 (56)	34·5 (41)	28	—

Description. Medium to large forms of evolute coiling, with deep, relatively wide umbilicus, which becomes even wider with growth. The whorl section is depressed oval, the height:width ratio is *c.* 0·5 throughout the whorls. The umbilical slope is steep, the flanks are low, and the venter is broadly arched. The sculpture consists of relatively dense primary and secondary ribs. The primaries are long, radial, but sightly projected in the inner whorls. In the middle whorls the primary ribs are somewhat sharper on the internal mould. The number of primaries is nearly constant, being twenty-eight at 75 mm and thirty-five at 131 mm diameters, respectively. The primary ribs end in sharp tubercles. The row of tubercles is situated above the middle of the flanks in the internal and middle whorls, then lowers to middle position on the body chamber. Radial or slightly projected secondary ribs arise from the tubercles. The secondary:primary rib ratio is 2·8 to 2·4 on the phragmocone and 2·2 on the body chamber. The specimens studied are incomplete, with the outer whorls partially preserved, so the entire length of the body chamber and the aperture cannot be studied. One large specimen shows septation at 133 mm largest preserved diameter, other specimens show the beginning of the body chamber at 95 and 115 mm.

Suture line cannot be clearly seen on either specimen, only some characteristic stephanoceratid portions are visible.

Remarks. The date of designation of *Stemmatoceras frechi* by Renz is usually regarded as 1913 (see e.g. Westermann and Riccardi 1979, p. 166); however, the first explicit reference to this form by this name was made by Renz in 1904, p. 77. The status of Quenstedt's form as the type of the genus *Stemmatoceras* has been commonly neglected and thus most references are misinterpretations (see synonymy). Weisert (1932), while refiguring the original specimen of Quenstedt, also illustrated another form (pl. 18, fig. 1, text-fig 23) from Beuren, now in the collections of the Stuttgart Museum (No. 22206), and this is a normal *Stephanoceras s.s.* Roché (1939, p. 205) recognized the difficulty arising from the use of name '*coronatum*' and so he introduced a new name, '*Cadomites Quenstedti*', for the form of Quenstedt, which is thus an objective synonym. This name was applied by Maubeuge (1951) for a serpenticone *Stephanoceras s.s.* (pl. 14, fig. 2), and for a badly preserved, specifically undeterminable ammonite (pl. 5, fig. 4). The form figured by Rostovtsev from the Transcaucasus (1985, pl. 40, fig. 1; pl. 41, fig. 1) is a robust stephanoceratid, close to *Teloceras acuticostatum.*

Distribution. The type came from the *Humphriesianum* Zone of Eningen, Swabia, and Kumm (1952) suggested the species (by the name *Stephanoceras coronatum* (Quenstedt) as a guide in the lowermost part of the *Humphriesianum* Zone (see Westermann 1967, p. 142). However, Sturani (1971, p. 50) stated, that *Stemmatoceras frechi* has a long vertical range throughout the *Humphriesianum* Zone, thus this species never became widely used as subzonal index.

The Közöskút specimens came from Beds 9, 4, 3 and 2, i.e. from both the *Humphriesianum* and *Blagdeni* Subzones, thus confirming the extended range of the species.

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